

# DTN: Observations, Lessons Learned and Questions to Consider

Will Ivancic  
IETF-91, DTN WG  
Nov 12, 2014

# Observations (1/2)

- **Bundle Expiration Time**

- Not clear as to what is the intent.
  - Is it meant to be useful lifetime of the information?
  - If Yes, than it must be set by the application
    - Applications don't know how to set this.
    - Useful to expire data-at-rest
      - » But, really looking at storage priority
  - If Yes, can be used in routing protocols
  - If No, then what is it used for?
- Currently appears to be set by the Network. See DTNbone notes
  - <http://www.dtnrg.org/wiki/DtnBone> (Setting Bundle Lifetimes)
- Makes protocol quite brittle and open to DOS attacks
- Is time needed or will a few priority queues work just as well or better?
  - Advantage: No need for any time synchronization for Bundle Protocol

- **No good way to terminate routing loops**

- Bundle Lifetime SHOULD NOT be used to terminate routing loops
  - Bundles can be and have been set to live for effectively infinite time
  - Extension Blocks are “optional” according to RFC5050
- Data should die naturally to avoid routing loops (e.g. Hop Count, something else)

# Observations (2/2)

- **Default Operations**

- If a forwarding agent accepts a bundle is the expectation that the agent will do its best to forward that Bundle?
  - If so, what is the value of Custody Transfer? Is it really needed?
  - One experiment showed no custody transfer performed worse due to processing requirements.
- If a route currently is not in the forwarding table for a bundle, should it be dropped or held until expired or a route appears?
  - If Dropped, then should the bundle never have been accepted?
  - ION drops if no route
  - DTN2 holds until expired which proved useful
    - <http://www.ietf.org/mail-archive/web/dtn-interest/current/msg00804.html>

- **Nobody appears to really be using the Dictionary.**

# Lessons Learned

- **Extension Blocks are nice for research, but maybe not so good for an implementation – made integration with HTTP difficult**
  - <http://www.ietf.org/mail-archive/web/dtn/current/msg00344.html>
- **Reactive Fragmentation proved quite useful**
  - NASA DTN Large File transfer experiment from space (happened in ground segment)
  - <http://www.ietf.org/mail-archive/web/dtn-interest/current/msg00804.html>
- **Need reliability without security requirement**
  - Sensor-webs, Internet of Things
  - Security requires additional processing
- **Forwarding Agent vs End-Point Naming Issues**
  - “Nodes should be identified by node IDs, not by endpoint IDs.”
  - <http://www.ietf.org/mail-archive/web/dtn-interest/current/msg04798.html>

# Questions to Consider (1/2)

- **Can bundle be really large or should they be packets?**
  - If really large, than perhaps header and payload should be treated differently
  - If packets, then you end up having to do a bunch of additional protocol to aggregate custody transfer responses on a highly asymmetric back channel or items such as the CCSDS Delay-Tolerant Payload Conditioning Specification
    - [cwe.ccsds.org/sis/docs/SIS-DTN/Draft Documents/DTN Protocol/CCSDS%20DTPC.docx](http://cwe.ccsds.org/sis/docs/SIS-DTN/Draft Documents/DTN Protocol/CCSDS%20DTPC.docx)
- **Sequence numbers?**
  - There appears to be a desire in many instances to proactively create fixed bundle sizes in DTN and then want the application to put them back in order. With proactive fragmentation, this is possible and there is a mechanism to allow reordering. With straight bundling, this is problematic as there is not such formalized standard sequencing. (In CCSDS, CFDP over DTN)
- **Do we need to support streaming?**
  - In order delivery or at least a sequence number to put things back together?
- **NASA has a desire to run DTN a 10 Gbps speeds**
  - Should speed and ability to implement some portions in hardware be a consideration?
  - Options and extension blocks make this even more difficult.
- **Do we really need SDNVs and if so for every field?**

# Questions to Consider (2/2)

- **Bundle Security**
  - Do we really need BAB and PID? Doesn't PID do everything BAB does and more?
  - Is the application or the network responsible for protecting the payload?
  - Is there a desire to hide one DTN network inside another (similar to IPsec VPNs)
- **Mixing Network Management and Store, Carry and Forward?**
  - There appears to be a lot of network management function in RFC5050. Report to, etc.
  - Perhaps this has heritage from space requirements, but separating it out may simplify the protocol and allow network management to evolve independent of BP core.
- **Does DTN need specified addressing scheme more than just URL naming to be deployed?**
  - CCSDS has IPN naming which is a flat, but controlled namespace